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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,743

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Sergio Debernardi

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AKERMAN SENTERFITT

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EXAMINER

WU, IVES J

ART UNIT

PAPER NUMBER

1797

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DELIVERY MODE

07/16/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/519,743	Applicant(s) DEBERNARDI, SERGIO	
	Examiner IVES WU	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/28/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

(1). The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "1a" has been used to designate both input and output of 1st compressor. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

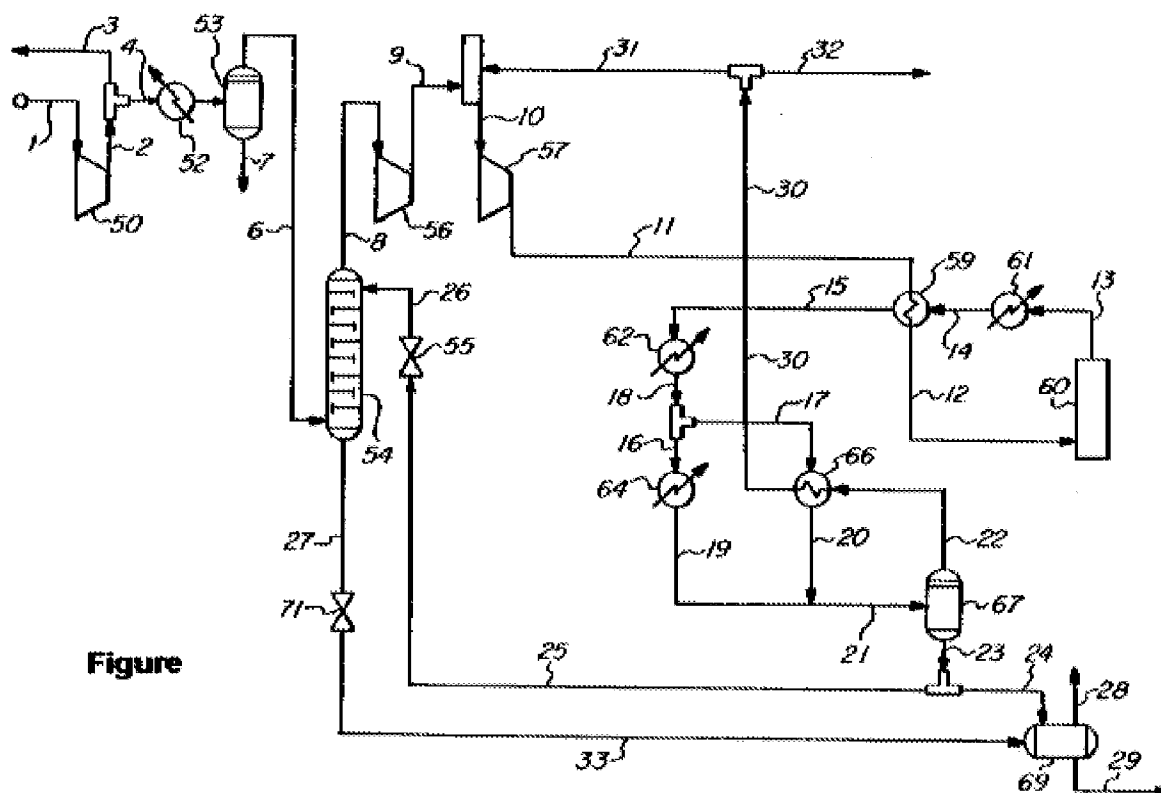
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(2). **Claims 1-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore (WO 01/66465A1) as applied to claim in view of Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants" , page 227, 1989, Torkilden et al (WO 99/13963).

As to Method for ammonia production through a catalytic reaction of pressurized synthesis gas in an appropriate compressor with many stages, each of which is equipped with an inlet and outlet for synthesis gas, which method includes a purification step through liquid ammonia of synthesis gas from water and carbon dioxide contained in it in **independent claim 1**, Moore (WO 01/66465A1) discloses ammonia synthesis process and apparatus for use therein (Title). As illustrated in the following diagram, which include several stages of compression and inlet, outlet for each compressor, a dehydrator 54 with liquid ammonia from line 25 to contact synthesis gas from line 6 for purification.



Figure

As to step of arranging a gas-liquid mixer in fluid communication, on one side with the outlet of 1st stage of compressor or with the outlet of an intermediate stage thereof and, on the other side, with the inlet of a stage immediately following 1st stage or intermediate stage, mixer having a portion of reduced cross section, extending for a prearranged axial length in method in **independent claim 1**, Moore (WO 01/66465A1) discloses dehydrator 54 to be one of any

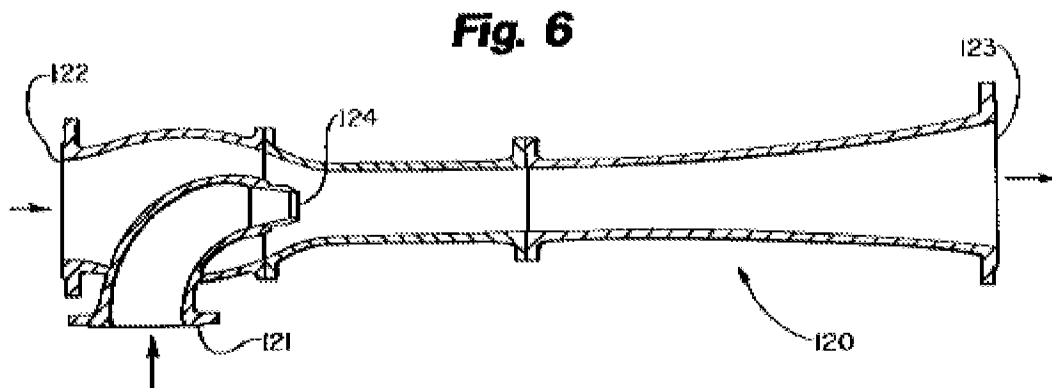
number of known gas-liquid contacting devices that bring gas and liquid phases into intimate contact with each other for the purpose of a diffusion exchange (page 9, line 7-9). Moore **does not teach** the gas-liquid mixer as claimed.

However, Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants"- page 227, last paragraph, **teach**, before coming to the additional reactor the make-up synthesis gas has to be dried by a technology developed by ACP together with Chemoprojekt Prague. For that purpose, liquid ammonia is added to the gas from the discharge side of the 3rd stage of synthesis gas compressor in a venturi tube.

The advantage of using Venturi mixing tube is to get a turbulent mixing to be intense and results in extremely efficient gas liquid contact. The mixing regime is preferably turbulent shear layer mixing. The liquid entrained in the gas may be in the form of droplets for gas continuous fluid phase distribution. The efficient mixing means that absorption can take place very rapidly and in a relatively small amount of solvent compared to that required in conventional absorption columns. This in turn means that the liquid duty in the equipment is dramatically reduced resulting in a consequential reduction in the size of any downstream regeneration section. At the same time, the mixing system used is simple and inexpensive compared to prior art systems, leading to reduced costs (page 2, line 10-23).

Therefore, it would have been obvious at time of the invention to install Venturi tube and its downstream separator disclosed by Bendix et al for the dehydrator of Moore in order to attain the above-cited advantage. Moreover, the dehydrator disclosed by Moore is genus, the Venturi tube disclosed by Bendix et al is species, one of ordinary skills in the art would recognize that all species work well for genus, motivated by a reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988).

As to step of axially feeding into mixer a flow of synthesis gas outbound from 1st stage or from intermediate stage at the same time as a flow of liquid ammonia flows being coaxial and in co-current in method in **independent claim 1**, as illustrated in Figure 6 of Torkildsen et al (WO 99/13963), which reads on this limitation of instant claim.



As to step of separating substantially anhydrous synthesis gas from the mixture of flows outbound from mixer and sending gas into stage following 1st stage or intermediate stage in method in **independent claim 1**, both Figure 8 of Bendix et al and Figure 1 of Torkildsen et al disclose the separator downstream of the Venturi tube mixer.

As to flow of synthesis gas being cooled to a temperature of between +8 and -20 degree C before being fed into the mixer in **claim 2**, Moore (WO 01/66465A1) discloses the bulk of gas stream to be cooled to a temperature of about 4.4 °C before entering the dehydrator (page 9, line 1-4).

As to cooling being carried out through a flow of liquid ammonia in **claim 3**, it would be obvious to use liquid ammonia to cool because choosing known material for suitability is obvious. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

As to cooling to be carried out upstream of the inlet of coaxial flows of synthesis gas and of liquid ammonia in mixer in **claim 4**, as shown in the Figure of Moore, the cooling is upstream of the inlet to the dehydrator.

As to flow of liquid ammonia being fed into mixer in the form of a plurality of high speed jets in **claim 5**, Torkildsen et al (WO 99/13963) disclose the jet pump 120 in Figure above, which would generate jet of liquid droplets (page 2, line 13-14, page 10, line 6-15). It would be obvious to have plurality of high speed jets arranged because duplication of parts is obvious. *In re Harza*, 274 F.2d 669, 124 USPQ378 (CCPA 1960).

As to flow of liquid ammonia being fed into mixer making it pass through a nozzle equipped with appropriate suitably sized openings or slits in **claim 6**, the Figure 6 above of Torkildsen et al would read on the instant claim - nozzle.

As to apparatus for carrying out the method comprising a compressor with many stages equipped with inlet and outlet, a gas-liquid mixer, arrangement of mixer, mixer having a portion of reduced cross-section, extending for a prearrangement axial length in **claim 7**, the disclosure of Moore, Bendix et al, Torkildsen et al is incorporated herein by reference, the most subject matters as currently claimed, have been recited or illustrated in applicant's claim 1, and have been discussed therein.

As to a gas-liquid separator being placed between mixer and subsequent stage of compressor in **claim 8**, the figure 8 of Bendix et al shows a separator between the Venturi tube and compressor.

As to at least one cooling group being placed between mixer and 1st stage of compressor in **claim 9**, the Figure of Moore shows the cooling group 52 between mixer and 1st stage compressor.

As to nozzle equipped with appropriate suitably sized openings or slits in fluid communication on one side with portion of reduced cross-section of mixer and on the opposite side with a line for feeding a flow of liquid ammonia into mixer in **claim 10**, Torkildsen et al (WO 99/13963) disclose the jet pump to generate the liquid droplets page 2, line13-14) together with the Figure 6, which reads on the instant claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Date: July 11, 2008

/Duane S. Smith/
Supervisory Patent Examiner, Art Unit 1797
7-14-08